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ABSTRACT

This paper examines data collected from 1988-1989 and identifies a number of correlated factors. The data were drawn from the "1988-1989 District and School Profile," a survey conducted and published annually by the Mississippi State Department of Education. The ACT scores used represent the aggregate scores from within a district while the other statistics represent actual reported data for each district. The "District and School Profile" contained over 200 items, but this paper considers only the following 12 areas: (1) percent of local funding; (2) size of districts; (3) percent of graduation rate; (4) ACT English usage; (5) ACT math; (6) ACT social sciences; (7) ACT natural sciences; (8) ACT composite; (9) percent of students taking college core curriculum; (10) proportion of graduates entering senior colleges; (11) proportion of graduates entering junior colleges; and (12) percent of students eligible for free lunch program. The statistical correlations of all variables are included as well as a summary of the results. Appended are the database on Mississippi education and an explanation of the statistical methodology. (KR)

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Science Instruction in Rural Mississippi
1989 Results

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Science Instruction in Rural Mississippi

1989 Results

Education reform in Mississippi has received a great deal of publicity and has been the focus of legislators, governors, school administrators, and teachers during the 1980's. As the decade drew to a close, the early momentum enjoyed by reformers lessened in the face of tightening economic conditions. This paper examines data collected in the final year of that decade of reform and identifies a number of correlated factors. The data was drawn from the 1988-1989 District and School Profile, a survey conducted and published annually by the Mississippi State Department of Education. While this survey encompassed the entire state, the data used in this paper was drawn only from 133 of the 154 total districts. The districts not included were classified as "metropolitan" rather than "rural" or were left out for other specific reasons (See Appendix A). The ACT scores used represent the aggregate scores from within a district (See Appendix B) while the other statistics represent actual reported data for each district. The District and School Profile contained over 200 items, but this paper considers only the following 12 specific areas:

1) Percent local funding (Variable 019):

This variable is based on the percentage of a district's total educational funding that is provided by local revenues. The range of this variable was from a low of 11.90% to a high of 39.80%. The mean for all 133 districts was 23.447%.

2) Size of Districts (Variable 024):

This variable relates the number of students within the districts studied. The range was from a low of 218 students to a

high of 10,380 while the mean was 2,714.947.

3) Percent graduation rate (Variable 025):

This variable is calculated based on the ratio of graduating seniors in a district to class size when the survey group was in the ninth grade. The range was from 24.7% to 85.4% with the mean being 63.74%.

The next five variables are based on ACT test data. The data represent averages from within a district.

4) ACT English Usage (Variable 121):

The English Usage component of the ACT had a range of 11.00 to 24.80 with the mean being 18.177.

5) ACT Math (Variable 122):

The math scores ranged from an average of 7.40 to 22.00 with the mean being 14.852.

6) ACT Social Sciences (Variable 123):

The social sciences component represented the lowest of the five ACT measurements. The range was from 6.30 to 21.20 with a mean of 14.748.

7) ACT Natural Science (Variable 124):

The natural science component represented the highest of the five ACT measurements. The range was from an average low score of 11.00 to an average high score of 24.40. The mean was 18.614.

8) ACT Composite (Variable 127):

The composite scores ranged from a low of 10.70 to a high of 23.30 with the mean being 16.723.

9) Percent of students taking college core curriculum (Variable 130):

This variable measured the percentage of students in a district

who had selected a college core curriculum as opposed to a vocational or other curriculum track. The range was from a low of 7.2% to a high of 52.0% with the average being 28.774%.

10) Proportion of graduates entering senior colleges (Variable 135):

The proportion of graduating seniors who enrolled in senior colleges ranged from 0.00 (no students entering senior colleges) to 0.67 with a median proportion of 0.238.

11) Proportion of graduates entering junior colleges (Variable 136):

The proportion of graduating seniors who enrolled in junior colleges ranged from 0.06 to 0.89 with the mean being 0.347.

12) Percent of students eligible for free lunch program (Variable 150):

This variable ranged from a low of 23.30% to a high of 96.50% with a mean of 58.447%.

The correlation coefficients for the various factors are presented in Table 1. Other statistical data is presented in tabular form in Appendix A.

DISCUSSION

As Table 1 shows, there are a number of factors in this study which show significant correlation. While not attempting to imply causality, it is nonetheless interesting to examine some of these correlations.

It has long been assumed that depressed economic conditions and the consequent low funding of education have caused Mississippi students to perform poorly on nationally administered tests. This study focused on the correlation between funding provided by the local school district and other variables.

The highest positive correlation (.51) was found to be between percent local funding and the percent of students in a district taking the college core curriculum. Other positive correlations existed between percent local

funding and ACT English Usage (.47), ACT Composite score (.47), ACT Natural Science (.46), ACT Math (.44), and ACT Social Science (.43). Since significance for a population of 133 would occur with correlations of .20 and above (Ary, 1976), correlation was also demonstrated between percent local funding and size of school districts (.24) and with the proportion of graduates entering senior college (.22).

Correlation below the level of significance was seen between percent local funding and percent graduation rate (.19) and proportion of graduates entering junior colleges (.08).

The only factor among the twelve considered which showed significant negative correlation with percent local funding was the percent of students eligible for free lunch within the districts. This would seem appropriate since the poorer districts which contribute less to educational funding would be expected to have a high population of economically disadvantaged students who would qualify for the free lunch program.

When examined from the standpoint of science instruction, the high correlation between percentage local funding and ACT Natural Science scores is worth noting. In many districts, lab equipment and supplies necessary for effective science teaching must be purchased with local district funds. In districts where this funding is low, teachers are often asked to teach science courses without these items, and science education consequently suffers. In a state facing a shortage of qualified science teachers, districts which offer proportionately lower levels of local funding also do not do as well in attracting the best teachers. Mississippi as a whole has been described as being seriously understaffed in the areas of science and mathematics teacher training. With only 2,920 certified science teachers, the statewide student to teacher ratio is 48.63 to 1. (Mississippi State Dept. of Education). The

differences in salaries offered by districts which contribute large local supplements and those which offer little or no supplement can be substantial. Teachers are also likely to "read between the lines" and realize that low supplements may mean low materials' budgets and choose to go to a district where funds are more readily available.

Another variable that correlates highly with percent district funding is that of percentage of students taking a college core curriculum. It is likely that districts where funding is low would not be able to make enough college core curriculum courses available to attract a high percentage of students. Many districts are just not funded at a high enough level to include advanced science, math, and foreign language courses in their curriculum.

SUMMARY

The rural South has consistently lagged behind the rest of the nation in many areas. The decade of the 1980's saw numerous efforts to deal with those deficiencies. Educators have been especially active in pushing through reform measures aimed at improving the performance levels of students in the region. While substantial improvements have been made, there remains a great deal of work to do.

One area where education can still look toward improvement is that of adequate funding. This paper has noted several correlations between educational funding and the achievement levels of students. Low levels of funding have a particularly negative impact in the area of science education where local funding is needed to purchase necessary materials and to attract and keep top quality teachers. Local and state level politicians should be aware that this lack of funding may play a part in the poor educational performance of students. Further studies should be conducted to identify levels of funding which seem

to maximize educational cost/benefit ratios. In areas where funding levels are extremely low, we feel that increases would likely show improvements in educational performance.

References

Ary, Donald and Jacobs, L.C. Introduction to Statistics: Purposes and Procedures. Holt, Rinehart, and Winston; New York. 1976.

Mississippi State Department of Education. 1988-89 District and School Profile. State Department of Education; Jackson, MS. 1989.

STATISTICAL CORRELATIONS

TABLE 1

MEASURED VARIABLES	CORRELATION COEFFICIENTS		
	Positively Correlated	No Correlation	Negatively Correlated
Variable 019: Percentage local funding of schools	(0.51) % Students taking college core curriculum (0.47) ACT English Usage (0.47) ACT Composite (0.46) ACT Natural Science (0.44) ACT Math (0.43) ACT Social Science (0.24) Size of Districts (0.22) % Graduates entering senior college	(0.19) % Graduation Rate (0.08) % Graduates entering junior college	(-.37) % Students on free lunch program
Variable 024: Size of School Districts (No. of students enrolled)	(0.26) % Students taking college core curriculum (0.24) % Local funding (0.24) ACT Social Science (0.21) ACT Composite (0.20) ACT Natural Science (0.20) % Graduates entering senior college	(0.18) ACT English Usage (0.18) ACT Math (0.08) % Graduation rate (-.11) % Graduates entering junior college	(-.23) % Students on free lunch program
Variable 025: Percentage Graduation Rate $\left(\frac{\text{No. graduating seniors}}{\text{No. entering 9th grade}}\right)$	(0.23) ACT Social Science (0.23) ACT Composite (0.22) ACT Math (0.21) ACT English Usage (0.21) ACT Natural Science	(0.19) % Local funding (0.15) % Students taking college core curriculum (0.08) Size of Districts (0.06) % Graduates entering junior college (-0.07) % Graduates entering senior college	(-.35) % Students on free lunch program

TABLE 1 (cont.)

MEASURED VARIABLES	CORRELATION COEFFICIENTS		
	Positively Correlated	No Correlation	Negatively Correlated
Variable 121: ACT English Usage scores	(.94) ACT Composite (.90) ACT Natural Science (.86) ACT Social Science (.84) ACT Math (.47) % Local funding (.32) % Students taking college core curriculum (.28) % Graduates entering junior college (.21) % Graduation rate	(.18) Size of Districts (-.14) % Graduates entering senior college	(-.68) % Students on free lunch program
Variable 122: ACT Math scores	(.93) ACT Composite (.85) ACT Natural Science (.84) ACT English Usage (.82) ACT Social Science (.44) % Local funding (.32) % Students taking college core curriculum (.24) % Graduates entering junior college (.22) % Graduation rate	(.18) Size of Districts (-.07) % Graduates entering senior college	(-.71) % Students on free lunch program
Variable 123: ACT Social Science scores	(.95) ACT Composite (.91) ACT Natural Science (.86) ACT English Usage (.82) ACT Math (.43) % Local funding (.25) % Graduates entering junior college (.24) Size of Districts (.23) % Graduation rate (.22) % Students taking college core curriculum	(-.10) % Graduates entering senior college	(-.69) % Students on free lunch program

TABLE 1 (cont.)

MEASURED VARIABLES	CORRELATION COEFFICIENTS		
	Positively Correlated	No Correlation	Negatively Correlated
Variable 124: ACT Natural Science scores	(.96) ACT Composite (.91) ACT Social Science (.90) ACT English Usage (.85) ACT Math (.46) % Local funding (.30) % Graduates entering junior college (.25) % Students taking college core curriculum (.21) % Graduation rate (.20) Size of Districts	(-.19) % Graduates entering senior college	(-.74) % Students on free lunch program
Variable 127: ACT Composite scores	(.96) ACT Natural Science (.95) ACT Social Science (.94) ACT English Usage (.93) ACT Math (.47) % Local funding (.29) % Students taking college core curriculum (.28) % Graduates entering junior college (.23) % Graduation rate (.21) Size of Districts	(-.13) % Graduates entering senior college	(-.74) % Students on free lunch program
Variable 130: Percentage of students taking college core curriculum	(.51) % Local funding (.35) % Graduates entering senior college (.32) ACT English Usage (.32) ACT Math (.29) ACT Composite (.26) Size of Districts (.25) ACT Natural Science (.22) ACT Social Science	(.15) Graduating % (.11) % Graduates entering junior college	(-.31) % Students on free lunch program

TABLE 1 (cont.)

MEASURED VARIABLES	CORRELATION COEFFICIENTS		
	Positively Correlated	No Correlation	Negatively Correlated
Variable 135: Proportion of graduates entering senior college	(.35) % Students taking college core curriculum (.32) % Students on free lunch (.22) % Local funding (.20) Size of Districts	(-.19) ACT Natural Science (-.14) ACT English Usage (-.13) ACT Composite (-.10) ACT Social Science (-.07) % Graduation rate (-.07) ACT Math	(-.51) % Graduates entering junior college
Variable 136: Proportion of graduates entering junior college	(.30) ACT Natural Science (.28) ACT English Usage (.28) ACT Composite (.25) ACT Social Science (.24) ACT Math	(.11) % Students taking (.08) % Local funding (.06) % Graduation rate (-.11) Size of Districts	(-.51) % of graduates entering senior college (-.37) % Students on free lunch program
Variable 150: Percentage of Students on free lunch program	(.32) % of Graduates entering senior college	None	(-.74) ACT Natural Science (-.74) ACT Composite (-.71) ACT Math (-.69) ACT Social Science (-.68) ACT English Usage (-.37) % Local funding (-.37) % Graduates entering junior college (-.35) % Graduation rate (-.31) % Students taking college core curriculum (-.23) Size of Districts

APPENDIX A

DATABASE ON MISSISSIPPI EDUCATION
Rural Counties

The source for all data in this report is from the District and School Profile, 1988-89 Reports. The profile sheets are published annually by the Mississippi State Department of Education. Profile sheets contain over 200 data items for each of the 154 Public School Districts in Mississippi. Data includes demographics of students and teachers, financial information on the district, and complete results of standardized testing for the year.

Data have been re-entered at Delta State University on the Complete Statistical Software System (CSS), available from Statsoft Corporation in Tulsa, Oklahoma. DSU has been compiling data bases of 150 variables for the past four years. Variables included in our 1989 statewide analysis are defined at the end of Appendix A.

Current data apply to what DSU has described as 133 "rural" school districts. The object has been to derive a relatively homogeneous group of districts for further analysis. The operational definition of "rural" was based on U.S. Census Bureau classifications. Seven of Mississippi's 82 counties were classified as "metropolitan", including:

Desota County	Memphis, TN Metro Area
Hinds County Madison County Rankin County	Jackson, MS Metro Area
Jackson County Hancock County Harrison County	Gulf Coast, MS Metro Area

All School Districts from the remaining 75 counties are included in the "rural" classification. Four Agricultural High School (AHS) Districts have been omitted since the AHS districts have a highly specialized curriculum and student body. This left 133 "rural" districts among the 154 public school districts in Mississippi.

APPENDIX A (cont.) District and School Profile Variables

css/pc: basic stats	Descriptive statistics in dbl precision N. of CASES = 133 [from 155] (MD pairwise deleted)				
	N	Description of Variable	Mean	Std.Err.	Std.Dev.
VAR6	133	Population (County)	29177.	1509.9	17413.
VAR7	133	% Non White (County)	39.	1.6	18.
VAR8	133	% High School Grads.(County)	49.	.6	7.
VAR9	133	% with College Deg.(County)	10.	.3	4.
VAR_010	132	Per Capita Income (County)	6525.	84.0	965.
VAR_011	133	% Poverty (County)	22.	.6	7.
VAR_012	133	Accreditation (District)	3.	.1	1.
VAR_013	133	Total Budget (District)	7639993.	435029.3	5017003.
VAR_014	133	Ad Valorem Per Pupil	417.	16.9	195.
VAR_015	133	Millage Levy	32.	.7	8.
VAR_016	133	Expenditure Per Pupil	2978.	30.8	355.
VAR_017	133	% Federal Funds	18.	.4	5.
VAR_018	133	% State Funds	58.	.8	9.
VAR_019	133	% Local Funds	23.	.5	6.
VAR_020	133	% Non White (K-6)	1.	.0	.
VAR_021	133	% Non White (7-8)	1.	.0	.
VAR_022	133	% Non White (9-12)	1.	.0	.
VAR_023	133	Total District Enrollment	1.	.0	.
VAR_024	133	% Eligible for Free Lunch	2715.	151.6	1749.
VAR_025	127	Graduation Rate	64.	1.0	11.
VAR_026	132	Student/Teacher Ratio	18.	.1	1.
VAR_027	133	Special Ed. (St/Teach.Ratio)	16.	.3	3.
VAR_028	132	% Teachers Advanced Degree	39.	.8	9.
VAR_029	133	% Teachers 0-1 Years	8.	.4	4.
VAR_030	133	% Teachers 2-9 Years	29.	.6	7.
VAR_031	133	% Teachers 10-19 Years	41.	.6	7.
VAR_032	133	% Teachers 20+ Years	23.	.6	7.
VAR_033	133	(1) BSAP3R 88	382.	.6	7.
VAR_034	133	BSAP3R 89	383.	.5	5.
VAR_035	133	BSAP5R 88	572.	.6	7.
VAR_036	133	BSAP5R 89	574.	.5	6.
VAR_037	133	BSAP8R 88	867.	.6	7.
VAR_038	133	BSAP8R 89	869.	.6	6.
VAR_039	133	BSAP3M 88	379.	.6	7.
VAR_040	133	BSAP3M 89	381.	.5	6.
VAR_041	133	BSAP5M 88	574.	.6	7.
VAR_042	133	BSAP5M 89	578.	.5	6.
VAR_043	133	BSAP8M 88	868.	.6	7.
VAR_044	133	BSAP8M 89	870.	.6	6.
VAR_045	133	BSAP3W 88	383.	.5	6.
VAR_046	133	BSAP3W 89	384.	.5	5.
VAR_047	133	BSAP5W 88	569.	.5	6.
VAR_048	133	BSAP5W 89	572.	.4	5.
VAR_049	133	BSAP8W 88	875.	.4	5.
VAR_050	133	BSAP*W 89	876.	.4	4.
VAR_051	133	(2) BSAP3CB 88	378.	.6	7.
VAR_052	133	BSAP3CB 89	380.	.5	6.
VAR_053	133	BSAP5CB 88	568.	.5	6.
VAR_054	133	BSAP5CB 89	571.	.5	6.
VAR_055	133	BSAP8CB 88	874.	.5	6.

See CODE Footnotes at end of table

APPENDIX A (cont.)

css/pc: basic stats	Descriptive statistics in dbl precision N. of CASES = 133 [from 155] (MD pairwise deleted)				
	N		Mean	Std.Err.	Std.Dev.
VAR_056	133	BSAP8CB 89	866.	.5	5.
VAR_057	123	BSAP3CW 88	386.	.5	6.
VAR_058	122	BSAP3CW 89	387.	.4	4.
VAR_059	122	BSAP5CW 88	578.	.5	6.
VAR_060	122	BSAP5CW 89	581.	.4	5.
VAR_061	122	BSAP8CW 88	875.	.5	5.
VAR_062	121	BSAP8CW 89	877.	.4	5.
VAR_063	133	BSAP3CT 88	382.	.5	6.
VAR_064	133	BSAP3CT 89	383.	.4	5.
VAR_065	133	BSAP5CT 88	572.	.6	6.
VAR_066	133	BSAP5CT 89	576.	.5	6.
VAR_067	133	BSAP8CT 88	869.	.5	6.
VAR_068	133	BSAP8CT 89	871.	.5	5.
VAR_069	130	BSAP3CP 88	373.	.9	10.
VAR_070	132	BSAP3CP 89	377.	.8	9.
VAR_071	129	BSAP5CP 88	558.	1.4	16.
VAR_072	131	BSAP5CP 89	568.	.9	11.
VAR_073	125	BSAP8CP 88	840.	3.3	37.
VAR_074	132	BSAP8CP 89	853.	1.8	21.
VAR_075	125	BSAP3CN 88	382.	.8	9.
VAR_076	127	BSAP3CN 89	384.	.7	7.
VAR_077	127	BSAP5CN 88	570.	1.6	18.
VAR_078	126	BSAP5CN 89	576.	1.3	15.
VAR_079	120	BSAP8CN 88	860.	2.0	22.
VAR_080	129	BSAP8CN 89	864.	1.5	17.
VAR_081	131	SAT4B 89 (3)	43.	.6	6.
VAR_082	131	SAT6B 89	42.	.5	6.
VAR_083	131	SAT8B 89	38.	.4	5.
VAR_084	121	SAT4W 89	57.	.6	7.
VAR_085	119	SAT6W 89	55.	.6	7.
VAR_086	119	SAT8W 89	51.	.5	6.
VAR_087	133	SAT4T 88	49.	.5	6.
VAR_088	133	SAT4T 89	49.	.7	8.
VAR_089	133	SAT6T 88	48.	.5	6.
VAR_090	133	SAT6T 89	48.	.6	6.
VAR_092	131	SAT8T 89	44.	.5	6.
VAR_093	131	SAT4CP 89	44.	.6	7.
VAR_094	132	SAT6CP 89	43.	.5	6.
VAR_095	131	SAT8CP 89	42.	.5	6.
VAR_096	125	SAT4CN 89	56.	.8	9.
VAR_097	126	SAT6CN 89	55.	.7	8.
VAR_098	124	SAT8CN 89	53.	.7	8.
VAR_099	131	FLE-R 88 (4)	270.	.6	7.
VAR_100	132	FLE-R 89	271.	.6	7.
VAR_101	131	FLE-M 88	272.	.8	9.
VAR_102	132	FLE-M 89	270.	.7	8.
VAR_103	131	FLE-W 88	267.	.5	6.
VAR_104	132	FLE-W 89	266.	.5	6.
VAR_105	130	FLE-CB 88	785.	2.0	23.
VAR_106	131	FLE-CB 89	785.	1.9	22.

APPENDIX A (cont.)

css/pc: basic stats	Descriptive statistics in dbl precision N. of CASES = 133 [from 155] (MD pairwise deleted)				
	N		Mean	Std.Err.	Std.De
VAR_107	116	FLE-CW 88	833.	1.3	1
VAR_108	118	FLE-CW 89	829.	1.3	1
VAR_109	131	FLE-CT 88	810.	1.8	2
VAR_110	132	FLE-CT 89	807.	1.7	1
VAR_111	129	FLE-FB 88	13.	.8	
VAR_112	131	FLE-FB 89	13.	.9	1
VAR_113	117	FLE-FW 88	2.	.3	
VAR_114	119	FLE-FW 89	3.	.3	
VAR_115	131	FLE-FT 88	8.	.5	
VAR_116	132	FLE-FT 89	8.	.5	
VAR_117	126	FLE-CP 88	766.	4.0	4
VAR_118	126	FLE-CP 89	784.	2.4	2
VAR_119	124	FLE-CN 88	807.	3.2	3
VAR_120	126	FLE-CN 89	815.	2.1	2
VAR_121	132	ACT-E 89 (5)	18.	.2	
VAR_122	132	ACT-M 89	15.	.3	
VAR_123	132	ACT-SS 89	15.	.3	
VAR_124	132	ACT-NS 89	19.	.2	
VAR_125	97	ACT-CB 89	14.	.2	
VAR_126	99	ACT-CW 89	19.	.2	
VAR_127	132	ACT-CT 89	17.	.2	
VAR_128	97	Core%-B89 (6)	22.	.9	
VAR_129	99	Core%-W89	36.	1.2	1
VAR_130	132	Core%-T89	29.	.9	1
VAR_131	97	ACT-CB 89	12.	.1	
VAR_132	99	ACT-CW 89	17.	.2	
VAR_133	132	ACT-CT 89	15.	.2	
VAR_134	132	Proportion Seniors	.	.0	
VAR_135	131	Proportion Seniors-college	.	.0	
VAR_136	131	Proportion Seniors-Jr. College	.	.0	
VAR_137	131	Proportion Seniors-Technical	.	.0	
VAR_138	130	Proportion Seniors-Business	.	.0	
VAR_139	127	Proportion-Other	.	.0	
VAR_149	133	Delta District	.	.0	
VAR_150	133	Percentage Non-white	58.	1.7	2

CODES: (1) BSAP=Basic Skills Assessment Program with R=Reading; M=Math; W=Written; C=Compos
(2) Secondary Codes: B 88= Black students in 1988
(3) SAT=Stanford Achievement Test
(4) FLE=Functional Literacy Examination with same Subtests as BSAP. Test given in G
(5) ACT=American College Test with Subtests: E=English Use; M=Math; SS=Social Studie and NS=Natural Science. C=Composite. Three secondary codes with B=Black; W=White; and T=Total
(6) Core%=Percentage of high school students enrolled in college core curriculum.

css/pc: basic stats	Descriptive statistics in dbl precision N. of CASES = 133 [from 155] (MD pairwise deleted)					
	N	Min	Max	Mean	Std.Err.	Std.Dev.
VAR_019	133	11.9000	39.80	23.447	.5128	5.914
VAR_024	133	218.0000	10380.00	2714.947	151.6199	1748.567
VAR_025	127	24.7000	85.40	63.740	.9678	10.906
VAR_121	132	11.0000	24.80	18.177	.2025	2.327
VAR_122	132	7.4000	22.00	14.852	.2749	3.158
VAR_123	132	6.3000	21.20	14.748	.2641	3.034
VAR_124	132	11.0000	24.40	18.614	.2397	2.753
VAR 127	132	10.7000	23.20	16.723	.2328	2.674
VAR_130	132	7.2000	52.00	28.774	.8869	10.190
VAR_135	131	.0000	.67	.238	.0134	.153
VAR_136	131	.0600	.89	.347	.0146	.168
VAR_150	133	23.3000	96.50	58.447	1.7147	19.775

css/pc: basic stats	Correlations r(x,y) N. of CASES = 133 [from 155] (MD pairwise deleted)											
standard mode	VAR _019	VAR _024	VAR _025	VAR _121	VAR _122	VAR _123	VAR _124	VAR _127	VAR _130	VAR _135	VAR _136	VAR _150
VAR_019	1.00	.24	.19	.47	.44	.43	.46	.47	.51	.22	.08	-.37
VAR_024	.24	1.00	.08	.18	.18	.24	.20	.21	.26	.20	-.11	-.23
VAR_025	.19	.08	1.00	.21	.22	.23	.21	.23	.15	-.07	.06	-.35
VAR_121	.47	.18	.21	1.00	.84	.86	.90	.94	.32	-.14	.28	-.68
VAR_122	.44	.18	.22	.84	1.00	.82	.85	.93	.32	-.07	.24	-.71
VAR_123	.43	.24	.23	.86	.82	1.00	.91	.95	.22	-.10	.25	-.69
VAR_124	.46	.20	.21	.90	.85	.91	1.00	.96	.25	-.19	.30	-.74
VAR_127	.47	.21	.23	.94	.93	.95	.96	1.00	.29	-.13	.28	-.74
VAR_130	.51	.26	.15	.32	.32	.22	.25	.29	1.00	.35	.11	-.31
VAR_135	.22	.20	-.07	-.14	-.07	-.10	-.19	-.13	.35	1.00	-.51	.32
VAR_136	.08	-.11	.06	.28	.24	.25	.30	.28	.11	-.51	1.00	-.37
VAR_150	-.37	-.23	-.35	-.68	-.71	-.69	-.74	-.74	-.31	.32	-.37	1.00

APPENDIX B

STATISTICAL NOTE

Using District Averages as the Unit of Observation

Mississippi had approximately half a million public school students enrolled in 1988-89. Conducting advanced statistical analyses on a statewide basis is impractical with this population. Consider the demands of using only 12 variables--a database of 6,000,000 numbers and over 24,000,000 digits (assuming four significant digits per number, as in xx.xx). Even if we could pay for the computer core time, we could never pay for the data entry!

Sampling a relatively small number of students (eg. 1,000) and obtaining information on the economic background, ethnicity, sex, teachers, core curriculum, and previous test scores of these 1000 students is, once again, a great burden. Defending the basis for selecting 1000 of 500,000 students is possibly an even greater problem.

Fortunately, many statisticians (eg.Kerlinger,) have recommended using aggregate scores to represent hundreds or thousands of individual subjects. Thus, the school district average on ACT composite would be one aggregate number which represents the scores of 500 seniors in that district. The % eligible for free lunch in a district becomes a relatively sensitive (and continuous, normal curve) index of socioeconomic status for the 2000 students in that district.

Using aggregate averages as the unit of observation solves many problems but it introduces new ones:

(1) The average of the (district) averages will be somewhat different (2-3%) from the average of .500,000 students taken individually. In Mississippi, this results in small districts (N 1000) carrying the same weight as large districts (N 10,000). Any variables correlated to district size will give undue weight to smaller districts. We have reduced the severity of this problem by limiting analysis to 133 relatively small, rural districts. (Appendix A).

(2) There is a severe loss of degrees of freedom. In the case of Mississippi, we must give up 500,000 of (1 for each public school student) and settle for 154 (all districts) or 133 (all "rural" districts). This loss suggests a severe loss in statistical power, although we continue to find plenty of statistically significant results. We also gain by a great reduction in error variance.

(3) By reducing the number of potential subjects from 500,000 to 154 districts, we reduce the number of variables which may be simultaneously considered. Many sources point out that it is essential to retain a minimum subject to variable ratio of between 10:1 and 20:1. Thus, with 13.3 rural districts, we should limit ourselves to between 7 and 14 variables for any analysis.

(4) It is appropriate to restrict generalizations to the unit of analysis. For the research reported here, we must restrict conclusions to the district. In other words, a superintendent or a State Department official might use these data to make policy decisions. However, it would be inappropriate to make recommendations to a specific student or parents concerning significant outcomes reported from this procedure.